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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte MARTIN WEBER, CHRISTIAN MALETZKO, ALEXANDER KHVOROST, RÜDIGER BLUHM, and SUSANNE ZEIHER

Appeal 2015-003808
Application 13/140,245
Technology Center 1700

Before JAMES C. HOUSEL, N. WHITNEY WILSON, and BRIAN D. RANGE, *Administrative Patent Judges*.

WILSON, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants[1] appeal under 35 U.S.C. § 134 from the Examiner's April 8, 2014 decision finally rejecting claims 17, 20–30, and 32–36.[2] We have jurisdiction over the appeal under 35 U.S.C. § 6(b).

We affirm.

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[1] Appellants identify the Real Party in Interest as BASF SE (Appeal Br. 2).
[2] Appellants state that "Claims 17–36 are presently pending" (Appeal Br. 2), but the Amendment filed July 7, 2014 indicates that claims 18 and 19 have been canceled. Moreover, claim 31 has been withdrawn. Appellants accurately state that claims 17, 20–30, and 32–36 are on appeal (*id.*).

CLAIMED SUBJECT MATTER

Appellants' invention is directed to molding compositions which have high ultimate tensile strength, high modulus of elasticity, high impact resistance, and good processability (Spec. 1–2). The claimed compositions comprise four components: (A1) a polyarylene ether having at most 0.1% by weight of phenolic end groups (A2), a polyarylene ether having at least 0.1% by weight of phenolic end groups, (B) a polyarylene sulfide, and (C) an anhydride of a polybasic carboxylic acid (Spec. 2). Details of the claimed composition are set forth in independent claim 17, which is reproduced below from the Claims Appendix of the Appeal Brief (*emphasis added*):

> 17. A composition comprising the following components:
> (A) at least two polyarylene ethers,
> (B) at least one polyarylene sulfide, and
> (C) at least one anhydride of a polybasic carboxylic acid with a number-average molar mass of at most 600 g/mol,
> wherein component (A) comprises the following constituents:
> (Al) at least one polyarylene ether having at most 0.01% by weight of phenolic end groups, calculated as amount by weight of OH, based on the amount by weight of component (Al), and
> (A2) at least one polyarylene ether having at least 0.1 % by weight of phenolic end groups, calculated as amount by weight of OH, based on the amount by weight of component (A2), *wherein the form in which the anhydrides of component (c) are present is a form that is not a form incorporated into a polymer chain, or a grafted form, or other copolymeric form, but instead that of additives which are present after reaction with end groups.*

REJECTIONS

I. Claims 17, 20–30, and 32–36 are rejected under 35 U.S.C. § 112, second paragraph as being indefinite.[3]

II. Claims 17, 20–30, and 32–36 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Weber[4] in view of Kadoi.[5]

III. Claims 17, 20–30, and 32–36 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Weber in view of Yeager.[6]

DISCUSSION

Appellants do not argue any of the claims separately (*see*, Br. 3–7). Accordingly, our analysis will focus on the rejections of claim 17.

REJECTION I

The Examiner concludes that claim 17 is indefinite because of a seeming contradiction between the claim recitation that the anhydrides of component (C) are present in "a form which is not incorporated into a polymer chain, or grafted form or other copolymeric form" but instead are present in the form "of additives which are present after reaction with end groups" (Ans. 2). According to the Examiner, "[i]f the anhydrides of component (C) have reacted with the end groups of a polymer chain, then

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[3] The statement of the rejection in both the Final Action and the Answer includes both claims 18 and 19 (Final Act. 2; Ans. 2). However, as noted above in footnote 2, both claims 18 and 19 have been cancelled.
[4] Weber et al., US 5,502,122, issued March 26, 1996.
[5] Kadoi et al., US 5,488,084, issued January 30, 1996.
[6] Yeager et al., US 6,627,704 B2, issued September 30, 2003.

one skilled in the art would expect that the anhydride is a form 'incorporated into a polymer chain' or 'other copolymeric form'" and, therefore a person of ordinary skill in the art could not ascertain the meets and bounds of the invention (*id.*). The Examiner also concludes that the phrase "that of additives which are present after reaction with end groups" is indefinite because "it is unclear whether or not the anhydride is required to react with the reactive end groups to meet the claim" (*id.*).

In the examination context, the relevant inquiry under 35 U.S.C. § 112, second paragraph, "is to determine whether the claims do, in fact, set out and circumscribe a particular area with a *reasonable* degree of precision and particularity." *In re Moore*, 439 F.2d 1232, 1235 (CCPA 1971) (emphasis added); *see also In re Packard*, 751 F.3d 1307, 1310 (Fed. Cir. 2014) ("a claim is indefinite when it contains words or phrases whose meaning is unclear"). "[T]he definiteness of the language employed must be analyzed—not in a vacuum, but always in light of the teachings of the prior art and of the particular application disclosure as it would be interpreted by one possessing the ordinary level of skill in the pertinent art." *Moore, 439 F.2d at 1235.*

In this instance, we agree with Appellants that in the context of the Specification, the claim language is sufficiently definite to meet the requirements of the § 112, second paragraph. In particular, as noted by Appellants (Br. 4), the Specification makes clear that anhydrides which are reacted with end groups are distinguished from those which are otherwise incorporated into the polymer (Spec. 19–20). We conclude that a person of skill in the art reading claim 17 in light of the Specification would understand that the claim language permits the anhydrides of component (C) to react with

the end groups of the polyarylene ethers, but not otherwise be incorporated into the polymer.

With regards to Examiner's concern that it is unclear whether the anhydride is required to react with the end groups, we agree with Appellants (Br. 4) that the claim language requires that the anhydrides **are** present after reaction with end groups, so that the anhydrides are required to react with the end groups.

Accordingly, we reverse the rejection under § 112.

REJECTION II

The Examiner finds that Weber discloses a composition comprising claimed components (A1), (A2), and (B) and is open to the use of other additives, but does not teach the presence of component (C) (the anhydride of a polybasic carboxylic acid with a number average molecular weight of at most 600 g/mol) (Ans. 3, citing Weber, Abstract, 7:4–18, 13:26). The Examiner further finds that Kadoi teaches a polyphenylene sulfide polyarylene ether blend in which a carboxylic acid anhydride, such as succinic anhydride, which has a molar mass of 100 g/mol, is melt-kneaded in order to obtain a product with increased heat resistance and impact resistance (Ans. 3, citing Kadoi, 1:61–64 and 2:26–30). The Examiner concludes that it would have been obvious to have included the succinic anhydride of Kadoi on Weber's composition to improve its heat and impact resistance (Ans. 3–4). The Examiner also finds that because the process used to prepare Weber's and Kadoi's compositions are so similar to that used to prepare the claimed compositions, the functional limitations in claim 17 relating to the form of the anhydride would have been prima facie obvious, thereby shifting the burden

to Appellants to establish a non-obvious difference (Ans. 4, citing *In re Best*, 562 F.2d 1252 (CCAP 1977)).

Appellants advance several arguments urging reversal of this rejection.

First, Appellants argue that Weber does not suggest any causation or correlation between the hydroxyl-terminated polyarylene ether and component (C) and an improvement of the mechanical properties (Br. 4). This argument is not persuasive, as it fails to rebut or address the Examiner's rationale for combining the references as set forth in the rejection. As noted by the Examiner, it is not necessary for Weber to suggest causation or correlation between the hydroxyl-terminated polyarylene ether and component (C) and an improvement of mechanical properties, as there was a different reason for making the required combination.

Second, Appellants argue that a person of skill in the art reading Kadoi would believe that Kadoi teaches that its anhydride is incorporated into the copolymers, as excluded by the claim language (Br. 4–5). In support of this argument, Appellants cite the disclosure in Kadoi that its polyphenylene sulfide shows IR signals at 1700 cm^{-1} to 1800 cm^{-1} (Kadoi, 13:1–14) as evidence that its anhydride is not present in additive form (Br. 5). Appellants assert that the IR signal in the 1700 cm^{-1} to 1800 cm^{-1} range "must be originated from a group incorporated to the main chain" (*id.*). However, as explained by the Examiner (Ans. 13), Appellants have not provided evidence (as opposed to attorney argument), which would suggest that the cited IR signal must have originated from the main chain. Thus, the evidence of record does not support reversal of the rejection for this reason.

Third, Appellants argue that they have provided unexpected results which overcome the prima facie case of obviousness (Br. 6–7). In

evaluating this argument, the burden rests with Appellants to establish (1) that the alleged unexpected results presented as being associated with the claimed invention are, in fact, unexpected, (2) that the comparisons are to the disclosure of closest prior art, and (3) that the supplied evidentiary showing is commensurate in scope with the claimed subject matter. *See In re Klosak*, 455 F.2d 1077, 1080 (CCPA 1972). In this instance, Appellants' showing is not commensurate in scope with the claimed subject matter because the experimental data only covers ranges of component A-1 from 25 to 40%, though claim 17 does not limit the amount of that component. Similarly, component A-2 is varied from 1 to 16%, but is not so limited in claim 17, and component B is varied only from 13.98 to 14%, and again is not limited in the claims. Moreover, as set forth in the Specification (*see*, Spec. 2–21), each of components A-1, A-2, B, and C can be met by a wide variety of compounds. The showing in the Weber Declaration does not purport to address whether the results shown therein would be expected to be similar if different compounds meeting the requirements of components A-1, A-2, B, and C were used.

Thus, the Weber Declaration does not overcome the prima facie case of obviousness.

REJECTION III

The Examiner makes the same findings from Weber as in connection with Rejection II. The Examiner finds that Yeager discloses an end-capped polyarylene ether in which at least 50% of the free hydroxyl groups have been functionalized with a capping agent, such as succinic anhydride (Ans. 7, citing Yeager, 1:49–55 and 5:1–10). The Examiner further finds that Yeager teaches

that the end-capping provides a desirable balance of toughness and processability (*id.*, citing Yeager, 2:8–12). The Examiner further determines that Yeager's use of the term "end-capped" suggests that the anhydride is not incorporated into the polymer chain, but instead is present in the form of an additive which can be present after reaction with reactive end groups (Ans. 7–8). The Examiner concludes that it would have been obvious to use Yeager's succinic anhydride end-caps in Weber's composition to achieve a desirable balance of toughness and processability (Ans. 7).

Appellants argue that the polymers disclosed in Yeager are a different type of polymer than that used in the claimed invention and are directed to a different end use (Br. 5–6). Appellants also contend that Yeager's hydroxyl terminated polyphenylene ether is first reacted with esters or anhydrides such that no free hydroxyl groups are present. (Br. 6). These arguments are not persuasive for the reasons well expressed by the Examiner in the Answer (Ans. 13–14).

Finally, Appellants again assert that the data in the Weber Declaration overcomes any prima facie case of obviousness by showing that the claimed invention produces unexpected results. This argument is not persuasive for the reasons outlined above in connection with Rejection II.

CONCLUSION

We REVERSE the rejection of claims 17, 20–30, and 32–36 under 35 U.S.C. § 112, second paragraph as being indefinite.

We AFFIRM the rejection of claims 17, 20–30, and 32–36 under 35 U.S.C. § 103(a) as being unpatentable over Weber in view of Kadoi.

We AFFIRM the rejection of claims 17, 20–30, and 32–36 under 35 U.S.C. § 103(a) as being unpatentable over Weber in view of Yeager.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED